Hantek2000 Series Handheld Scopemeter

User Manual

V1.1

Copyright Declaration

General Safety Summary

Read the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To evade potential hazards, use this product only as specified.

Only qualified personnel should perform maintenance.

Avoid fire or personal injury.

Use suitable power cord. Use only the power cord specified for this product and certified for the country of use.

Connect and disconnect properly. Connect a probe with the oscilloscope before it is connected to measured circuits; disconnect the probe from the oscilloscope after it is disconnected from measured circuits.

Ground the product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Connect the probe in a right way. The probe ground lead is at ground potential. Do not connect the ground lead to an elevated voltage.

Check all terminal ratings. To avoid fire or shock hazard, check all ratings and markings on the product. Refer to the product manual for detailed information about ratings before making connections to the product.

Do not operate without covers. Do not operate this product with covers or panels removed.

Avoid exposed circuitry. Do not touch exposed connections and components when power is present.

Do not operate with suspected failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Assure good ventilation.

Do not operate in wet/damp environments.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry.

Safety Terms and Symbols

Terms on the product. The following terms may appear on the product:

Danger	It represents that harms may be caused to you at once if you perform the operation.
Warning	It represents that latent harms may be caused to you if you perform the operation.
Notice	It represents the damage possibly caused to the product or other properties if you perform the operation.

Characters on the product. The following characters may appear on the product:



Notice Please read the manual	Protective ground terminal	Measuring ground terminal	Chassis ground terminal

Product Scrapping

Device Recycling

We need extract and utilize natural resources to produce this device. If you do not reclaim the device in a proper way, some substances it contains may become harmful or poisonous to environments or human bodies. To avoid them being released outside and to minimize the waste of natural resources, we suggest you reasonably call back this device to ensure proper recovery and recycling of most materials within it.

Brief Introduction

This series Scopemeter is compact, portable, and flexible operation; Using color TFTLCD and pop-up menus to display; to achieve its ease of use, greatly improving the user productivity.

In addition, this product has superior performance and it is powerful, affordable, high cost. The real-time sampling rate can be as high as 250MSa/S,can meet the market demand of complex signals and capture speed; Support for USB storage devices, users can upgrade via USB, the maximum to meet customer needs.

Model	Channel	Bandwidth	Sampling Rate	GEN	DMM
Hantek2C72	2	70MHz	250MSa/S	N	Y
Hantek2C42	2	40MHz	250MSa/S	N	Y
Hantek2D72	2	70MHz	250MSa/S	Y	Y
Hantek2D42	2	40MHz	250MSa/S	Y	Y

Product features:

- New exterior design, small size, light weight, more convenient to carry
- Color TFT LCD, 320×240 pixels resolution
- Maximum real-time sampling rate: 250MSa/s
- With edge triggering function, it can be automatically detected
- Backlight luminance can be adjusted
- User selectable fast offset calibration
- Pop-up menu makes it easy to read and easy to use
- Selectable bandwidth limit: 20MHz

Content

Copyright Declaration ... 2
- General Safety Summary ... 3
- Safety Terms and Symbols ... 4
- Product Scrapping ... 4

Brief Introduction ... 5
Content ... 6
Getting Started ... 7
- Front Panel ... 8
- The user interface ... 9
- General Inspection ... 9
- Functional Check ... 10
- Probe Check ... 10

Function Introduction ... 12
- Menu and Control Keys ... 13
- Connectors ... 14
- Automatically set ... 14
- Default Setting ... 15
- Horizontal System ... 16
- Vertical System ... 17
- Trigger System ... 17
- Save Waveform ... 18
- Reference Waveform ... 19
- Measurement ... 19
- Utility ... 21

DMM ... 23
- Interface ... 23
- Measurement ... 23

Generator ... 26
- Interface ... 26
- Operation description ... 26

Troubleshooting ... 29
General Care and Cleaning ... 30
Appendix A: Technical Specifications ... 31
Appendix B: Accessories ... 35

Getting Started

This oscilloscope is a small, lightweight portable instrument，to provide users with a convenient and easy to operate front panel, you can perform basic tests.

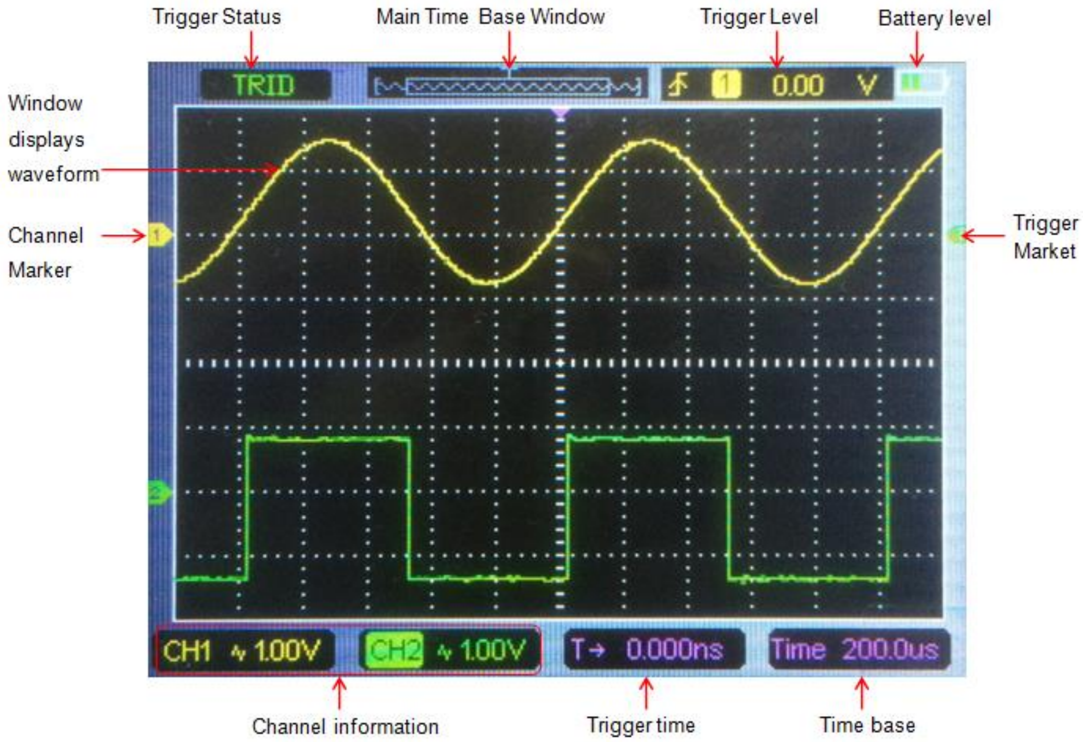
- ✧ Front Panel
- ✧ The user interface
- ✧ General Inspection
- ✧ Functional Check
- ✧ Probe Check

Front Panel

The following diagram briefly describes the front panel of this series oscilloscope, so that you can be familiar with it in the shortest possible time.



The user interface



General Inspection

Please check the instrument as following steps after receiving an oscilloscope:

Check the shipping container for damage:

Keep the damaged shipping container or cushioning material until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically.

Check the accessories:

Accessories supplied with the instrument are listed in "Accessories" in this manual. If the contents are incomplete or damaged, please notify the franchiser.

Check the instrument:

In case there is any mechanical damage or defect, or the instrument does not operate properly or fails performance tests, please notify the franchiser.

Functional Check

Follow the steps below to perform a quick functional check to your oscilloscope.

1. Power

   Press the power key and the device starts. Press the power key again, and the device will shut down. Before start it, please confirm that the battery has enough power.

   The oscilloscope is equipped with a power adapter and the interface is Type-C. The input AC power supply is 100~240V, 50~60Hz. The output is 5V@2A. The power adapter can be used to supply the oscilloscope or charge the battery.

   When connect the power adapter to the oscilloscope, if the battery is not installed inside the oscilloscope, the power key backlight is red and flash; if the battery is installed inside the oscilloscope and the battery power is not filled, the power key backlight is red; if the battery is installed inside the oscilloscope and the battery power is full, the backlight of the source key is extinguishes.

2. Observe the waveform

   1) Set the switch on the probe to 1X and connect the probe to Channel 1 on the oscilloscope. First, align the slot in the probe connector with the protuberance on the CH1 BNC and push to connect; then, turn to right to lock the probe in place;

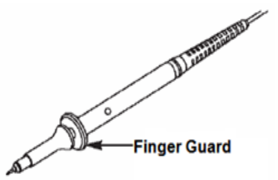
   2)Connect the probe tip and reference lead to the generator output connector. Recommended input ~2V@1KHz peak-peak square wave.

   3)Press the **[Auto]** button and you should see within a few seconds a square wave of about 2V peak-to-peak at 1KHz in the display. Repeat the steps to observe CH2.

Probe Check

Safety

When using the probe, keep your fingers behind the guard on the probe body to avoid electric shock. Do not touch metallic portions of the probe head while it is connected to a voltage source. Connect the probe to the oscilloscope and connect the ground terminal to ground before you start any measurements.



Manual Probe Compensation

Upon the first connection of a probe and an input channel, you should manually perform this adjustment to match the probe to the input channel. Uncompensated or miscompensated probes may lead to errors or faults in measurement. To adjust the probe compensation, follow the steps below.

1. Press **Channel** button to enter channel setting menu, Set the Probe option

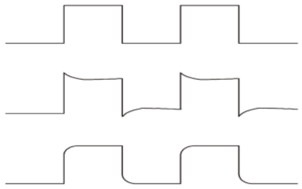
attenuation in the channel menu to 10X. Set the switch on the probe to 10X and connect the probe to Channel 1 on the oscilloscope. If you use the probe hook-tip, ensure it is firmly inserted onto the probe. Attach the probe tip to the generator output connector (recommended input ~2V@1KHz peak-peak square wave), and connect the reference lead to the ground of the generator. Press the **[Auto]** button.

2. Check the shape of the displayed waveform.

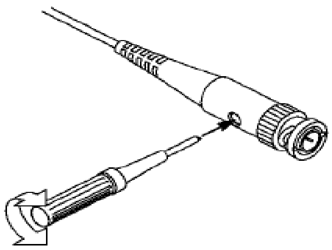
Compensated correctly

Overcompensated

Undercompensated



3. If necessary, use a nonmetallic screwdriver to adjust the variable capacity of your probe until the shape of the waveform turns to be the same as the above figure. Repeat this step as necessary. See the figure below for the way of adjustment.



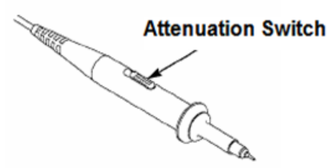
Probe Attenuation Setting

Probes are of various attenuation factors which affect the vertical scale of the signal. The Probe Check function is used to verify if the Probe attenuation option matches the attenuation of the probe.

You can press **Channel** button to enter the channel setting menu and select CH1, and select the Probe option that matches the attenuation factor of your probe.

Make sure that the Attenuation switch on the probe matches the Probe option in the oscilloscope. Switch settings are 1X and 10X.

When the Attenuation switch is set to 1X, the probe limits the bandwidth of the oscilloscope to 6MHz. To use the full bandwidth of the oscilloscope, be sure to set the switch to 10X.



Function Introduction

This chapter will introduce the functions of oscilloscope in detail.

- Menu and Control Keys
- Connectors
- Automatically set
- Default setting
- Horizontal System
- Vertical System
- Trigger System
- Save Waveform
- Reference Waveform
- Measurement
- Utility

Menu and Control Keys



All the keys are described as follows:

Scope: Oscilloscope mode.

DMM: Multimeter mode.

AWG: Waveform generator.

Menu: Function menu.

Trig: Trigger setting menu.

Enter: In scope, save the user-defined settings of the oscilloscope;
In generator, press the button to confirm after entering the character.

Auto: It automatically adjust the horizontal and vertical scales of the oscilloscope automatically and set the trigger coupling, type, position, slope, level and mode, etc., to acquire a stable waveform display.

Channel: Channel setting menu.

Time: Horizontal setting menu.

Zoom and move keys:

In the trigger menu, the left and down keys push the trigger level down, and the right and upper direction keys push the trigger level up;

In the channel menu, the upper and lower direction keys change the zero level position of the channel, and the left and right direction keys change the volt/div of the channel;

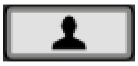
In the time base menu, the upper and lower direction keys change the time/div, and the left and right direction keys change the horizontal trigger position;

In DMM, switch measurement function;

In generator, after choosing a parameter, the left and lower direction key will reduce the parameter value, the right and up direction key will increase the parameter value; it is also used for the digital selection of the virtual keyboard.

F1/F2/F3/F4: Multi function key, in each menu mode, is responsible for selecting

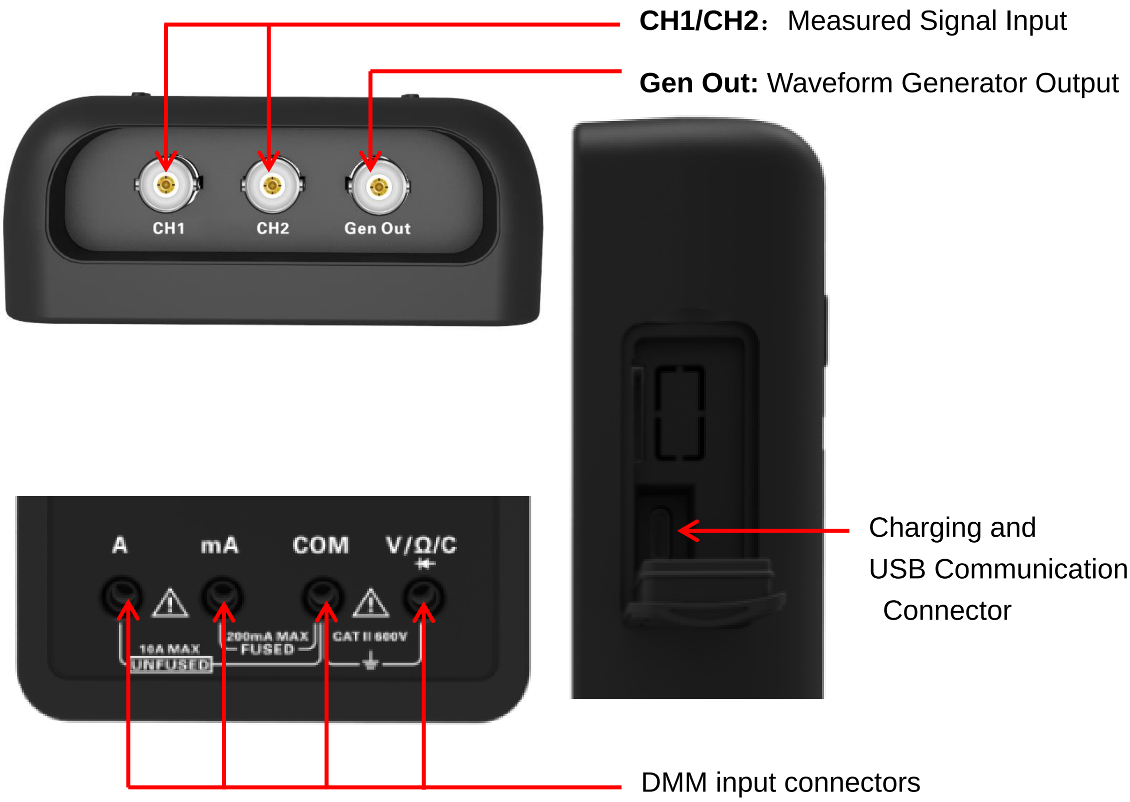
corresponding menu items in the screen.

: Shortcut keys. Long press this button to enter the menu, and choose shortcut key function; After setting, press this button single time to respond to the corresponding function.

: In scope, stop or run the waveform acquisition;
In DMM, hold the measuring data or update data;
In generator, turn on or off the waveform output.

: Power key.

Connectors



Automatically set

Auto set is one of the advantages digital oscilloscopes have. When you push the Auto button, the oscilloscope will identify the type of waveform (sine or square wave) and adjust controls according to input signals so that it can accurately display the waveform of the

input signal.

Functions	Settings
Cursor	Off
Display Format	Set to YT
Horizontal Position	Adjusted
SEC/DIV	Adjusted
Trigger Level	Set to 50%
Trigger Mode	Auto
Trigger Source	Adjusted
Trigger Slope	Adjusted
Trigger Type	Edge
Vertical Bandwidth	Full
Vertical Coupling	DC
VOLTS/DIV	Adjusted

The Auto function examines all channels for signals and displays corresponding waveforms. Auto determines the trigger source according to the following conditions.

- If multiply channels get signals, the oscilloscope will use the channel with the lowest frequency signal as the trigger source.
- If no signals are found, the oscilloscope will use the lowest-numbered channel displayed in Auto Scale as the trigger source.
- If no signals are found and no channels are displayed, the oscilloscope will display and use Channel 1 as the trigger source.

Default Setting

Long press  button, enter Short key setting menu, and select **Default**. Press  button, pops up the prompt to recall the default settings on the screen, now press **F1** to confirm. The oscilloscope will display the CH1 waveform and remove all the others. Press **F4** to cancel. The table below gives the options, buttons and controls that change settings at default setup.

Menu or System	Option, Button or Knob	Default Setting
Cursor	Type	Off
	Source	CH1
	Horizontal (amplitude)	±4div
	Vertical (time)	±4div
Display	Format	YT
Horizontal	Position	0.00s
	SEC/DIV	500μs

Measure	On or Off	Off
Trigger (Edge)	Source	CH1
	Slope	Rising
	Mode	Auto
	Level	0.00v
Vertical System, All Channels	Bandwidth Limit	Unlimited
	Coupling	AC
	Probe Attenuation	1X
	Position	0.00div (0.00V)
	VOLTS/DIV	1V

The following settings do not change when you recall default settings.

- Language Option
- Saved Settings
- Saved waveform
- Saved Reference Waveforms
- Calibration Data

Horizontal System

Press **Time** button to enter horizontal system menu, use the direction keys to change the horizontal scale (time base) and the horizontal trigger position. When you change the horizontal scale, the waveform will expand or contract to the screen center.

1. **SEC/DIV Knob:** Used to change the horizontal time scale so as to magnify or compress the waveform horizontally. If the waveform acquisition is stopped (by using  button), press **Time** button and **Up** or **Down** buttons to expand or compress the waveform.

2. **Horizontal Position Knob:** Used to control the trigger position against the screen center. Press Time button and Right or Left buttons to move the waveform right or left. The key resolution vary according to time base. Press "AUTO" key can make the horizontal position return to zero.

3. Mode: Y-T, Roll, Scan.

Y-T: YT format shows the vertical voltage in relation to time (horizontal scale)

Roll: In Roll mode, the waveform display rolls from right to left. Trigger or horizontal offset control of waveforms is available during Roll Mode, and it's only available when set to 100ms/div or slower.

Scan: In Scan Mode, the waveform display scan updates from left to right. In Scan mode, trigger and horizontal offset control of waveforms are available during Scan Mode. This mode is only available when set to 100ms/div or slower. Generally, used for measuring low frequency signal. When the time/div is 100ms/div or slower, the oscilloscope

Automatically enters the scan mode.

Vertical System

Vertical system can be used to adjust the vertical scale and location and other settings of the channel. Each channel has a separate vertical menu, and each channel can be set separately.

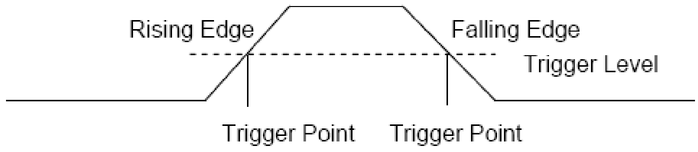
1. **Vertical Position**
   Press **Channel**->**F1** to select the channel, and press Up or Down direction keys to move the vertical position of the selected channel.
2. **VOLTS/DIV Settings**
   The range of Volt/div is 10mV/div-10V/div (1X), or 100mV/div-100V/div (10X), 1V/div-1000V/div (100X), step by 1-2-5.
   Press **Channel->F1** to select the channel, and press Right or Left direction keys to change the Volt/div of the selected channel.

3. Channel Setting Menu

Options	Settings	Comments
On/Off	On Off	Turn on the waveform display. Turn off the waveform display.
Coupling	DC AC GND	DC passes both DC and AC components of the input signal. AC blocks the DC component of the input signal and attenuates signals below 10Hz. GND disconnects the input signal.
Probe	1X 10X 100X 1000X	Selects a value according to the probe attenuation factor so as to ensure correct vertical readouts. Reduce bandwidth to 6MHz when using a 1X probe.
BW 20MHz	On Off	Limits the bandwidth to reduce display noise; filters the signal to eliminate noise and other unnecessary HF components.

Trigger System

The trigger determines when the oscilloscope begins to acquire data and display a waveform. Once a trigger is properly set up, the oscilloscope can convert unstable displays or blank screens to meaningful waveforms.
The triggering mode of this series oscilloscope is edge trigger.
Edge trigger distinguishes the trigger points by seeking the specified edge (rising, falling, rising & falling) and trigger level.



Trigger Source: Select the trigger source signal to CH1 or CH2. You can use the trigger source options to select the signal that the oscilloscope uses as a trigger.

Trigger Mode: You can select the Auto or Normal mode to define how the oscilloscope acquires data when it does not detect a trigger condition. Auto Mode performs the acquisition freely in absence of valid trigger. It allows the generation of untriggered waveforms with the time base set to 100ms/div or slower. Normal Mode updates the displayed waveforms only when the oscilloscope detects a valid trigger condition. Before this update, the oscilloscope still displays the old waveforms. This mode shall be used when you want to only view the effectively triggered waveforms. In this mode, the oscilloscope displays waveforms only after the first trigger.

Trigger Level: It sets the amplitude level the signal must cross to cause an acquisition when using the Edge or Pulse Width trigger. Press **Trig** button to enter, and press Up or Down direction keys to change the trigger level.

Force Trigger: Used to complete an acquisition regardless of an adequate trigger signal. This button becomes useless if the acquisition is already stopped.

Save Waveform

Press **Menu** button to enter, and select **Save** to enter store waveform menu. The waveform can be saved to the oscilloscope inside, also can be recalled to view.

The Save Menu Table

Menu	Setting	Description
Position	1,2,3,4,5,6	Select the internal storage position.
Save		Save waveform data.
Recall		Recall the waveform.

To save the waveform, follow these steps:

1. Press **F1**, select the storage position of the waveform.
2. Press **F2** to save the waveform data to the specified position. Also users can long press  button to enter, and select F4->F2 (Data Save) as shortcut keys. Press  button one time to save the current waveform data.
3. Press **F3**, recall the saved waveform. The waveform can be enlarged or reduced in the Channel or Time menu by using the direction keys.

Attention:

1. Waveform storage can not only save the waveform of the current channel, but also save the current state settings at the same time.

2. users can permanently store 6 waveforms in the oscilloscope memory and rewrite them at any time.

Reference Waveform

The REF channel is used to display the reference waveform, which can compare the actual waveforms with the reference waveforms so as to find out the differences.

Press **Menu** button to enter, and select **Ref** to enter reference Waveform menu.

REF Menu Table

Menu	Setting	Description
Position	Ref-A Ref-B	The REF waveform is saved to the oscilloscope Ref-A or Ref-B.
Enable	On	Open the REF waveform.
	Off	Close the REF waveform.
Source	CH1	Select CH1 to save as a REF waveform.
	CH2	Select CH2 to save as a REF waveform
Save		Save the REF waveform.

To save the reference waveform, follow these steps:

1. Press **F1** to select the position of the reference waveform.
2. Press **F2** to open the REF channel.
3. Press **F3** to select the source to CH1 (or CH2), and only select the open channel.
4. Press **F4** to save the current waveform to the specified location..

Measurement

Scale measurement

Graticule: This method allows you to make a quick, visual estimate and take a simple measurement through the graticule divisions and the scale factor.

For example, you can take simple measurements by counting the major and minor graticule divisions involved and multiplying by the scale factor. If you counted 6 major vertical graticule divisions between the minimum and maximum values of a waveform and knew you had a scale factor of 50mV/division, you could easily calculate your peak-to-peak voltage as follows:

6 divisions x 50mV/division = 300mV.

Cursor measurement

The cursor measurement has two parallel lines on the screen, and move two lines to measure the time and voltage parameters of the input signal. The result of cursor measurement will be displayed on the second page of the cursor menu. Before use cursor

measurement, make sure that the measured source is the signal you need to measure.

Press **Menu** button to enter, and select **Cursor** to enter cursor measurement.

Cursor Measurement Menu Table

Menu	**Setting**	**Description**
Enable	On Off	Open the cursor measurement. Close the cursor measurement.
Type	Voltage	The horizontal line is shown to measure the voltage parameters.
	Time	The vertical line is shown to measure the time parameters.
Source	CH1 CH2	Select the measured source.
Cursor1		Select Cursor1 and press up, down, left and right keys to move the Cursor1 position, and display the Cursor1 value.
Cursor2		Select Cursor2 and press up, down, left and right keys to move the Cursor2 position, and display the Cursor2 value.
Increment		The difference between the Cursor1 and the Cursor2.

To do cursor measurement, follow these steps:

1. Press **F1** to open the cursor measurement;
2. Press **F2** to select a type of cursor measurement.
3. Press **F3** to select the channel that needs to be measured.
4. Press **F4** to enter the second page, press F1 or F2 to select Cursor1 or Cursor2, press up, down, left and right to move Cursor1 or Cursor1;
5. The result of cursor measurement will be displayed on the cursor menu.

Automatic Measurement

The oscilloscope provides 2 kinds of automatic measurements, including frequency and amplitude.

Press **Menu** button to enter, select **Measure** to enter automatic measurement. Press **F1** to open, the measurement results will be displayed on the top left corner of the screen.

Measurement Menu Table

Menu	**Description**
Frequency	Measure the frequency of the signal.
Amplitude	Measure the amplitude of the signal, the low end value - the top value.

Attention:

In the measurement result, the yellow font is the result of CH1, and the green font is the result of CH2.

Utility

Press **Menu** button to enter.

Utility Menu Table

Menu	Setting	Description
Language	中文 English	Set the menu language.
Sound	On Off	Open the key sound. Close the key sound.
Backlight luminance	1~10	Set backlight brightness of the screen.
Backlight time	30s 60s 90s 120s Unlimited	Set the screen backlight time.
System information		Display system information, such as software version or PCB version.
Automatic shutdown	5 Minute 10 Minute 20 Minute 30 Minute Unlimited	Set automatic shutdown time.
Calibration	Start Return	Start the self calibration. Exit the self calibration.

Note:

1. Backlight time and automatic shutdown time will not be executed when the oscilloscope is plugged in with an external charging device or connected to a computer via a USB cable.
2. Shutdown automatically saves last setup.

Self calibration

The self calibration routine helps optimize the oscilloscope signal path for maximum measurement accuracy. You can run the routine at any time but should always run it if the ambient temperature changes by 5℃ or more. For a more accurate calibration, please power on the oscilloscope and wait for 20 minutes until it has adequately warmed up.

To do self calibration, follow these steps:

1. Ensure that no input signal is input, otherwise it may damage the instrument.
2. Press **Menu** button to select the self calibration function.

Update

Connect the oscilloscope to the computer with USB cable. Press the F1 button and the

boot button at the same time. The backlight of the button will jump between red and green, that is, enter the upgrade mode. Using the Dfu download tool to download the program, the oscilloscope power off, and then re-energize.

Shortcut key

Long press  button to enter shortcut key settings menu, and choose shortcut key function; After setting, press this button single time to respond to the corresponding function.

Default settings: Long press  button to enter, and select F1 (Default) as the shortcut key, then press  button one time and select F1 TO confirm to recall the default settings

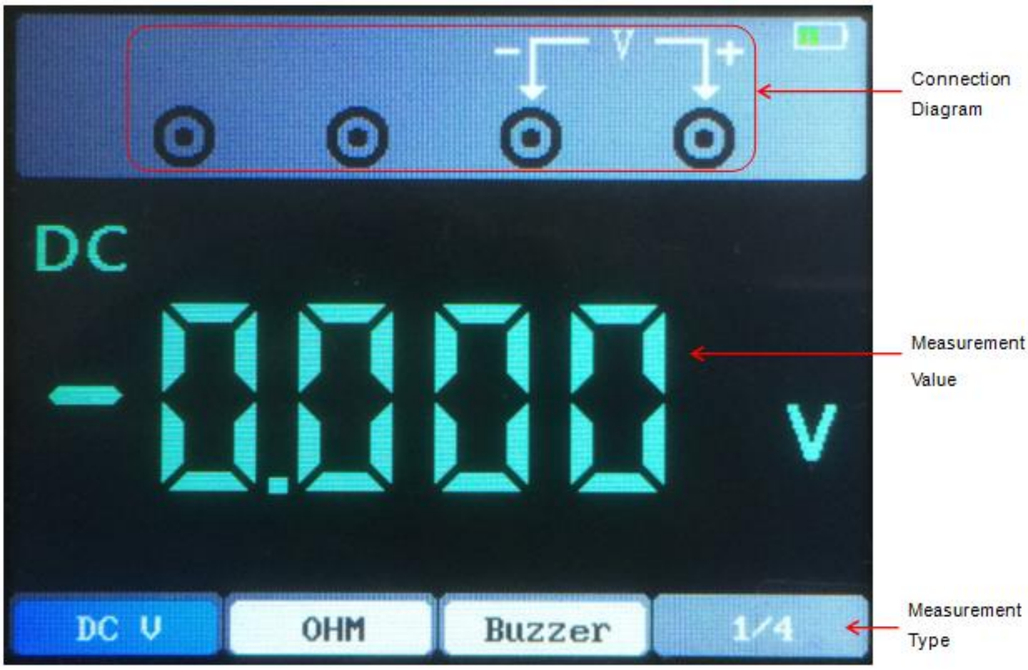
Custom settings: Long press  button to enter, and select F2 or F3 (custom 1 or 2) as shortcut keys. Now press **Enter** button and click F1 to confirm to save the current settings to custom settings. Press  button one time and click F1 to confirm to recall the custom settings.

Save data: Long press  button to enter, and select F4->F1 (Data Save) as shortcut keys. Press **Menu -> Save** to enter the save menu, select a location, press  button one time to save the current waveform data.

DMM

This chapter introduces the multimeter function.

Interface



The measuring types include DC voltage (V, mV), AC voltage, DC current (A, mA), AC current (A, mA), resistance, capacitance, diode, and on-off test.

Measurement

1. DC and AC voltage measurement
    a) Press the power button to turn on, then press the "DMM" button to enter to the multimeter function interface;
    b) Press the up, down, left and right direction keys or F1, F2, F3, F4 multi-function keys to select "DC V", "DC mV" or "AC V";
    c) Insert the black pen into the input port of the COM banana socket, and insert the red pen into the input port of the V/Ω/C banana port;
    d) Connect the red and black forms to the measured point. The voltage value of the measured point will be displayed on the screen.

2. DC and AC current measurement

a) Press the power button to turn on, then press the "DMM" button to enter to the multimeter function interface;
b) To measure the DC current greater than 200mA, press the up, down, left and right keys or F1, F2, F3, F4 multi function keys to select "DC A" or "AC A", and insert the black pen to the input end of the COM banana socket, and insert the red pen into the input port of the “A” banana socket;
c) To measure the DC current less than 200mA, press the up, down, left and right keys or F1, F2, F3, F4 multi function keys to select "DC mA" or "AC mA", and insert the black pen to the input end of the COM banana socket, and insert the red pen into the input port of the “mA” banana socket.;
d) Connect the red and black forms to the measured point. The current value of the measured point will be displayed on the screen.

3. Resistance measurement
a) Press the power button to turn on, then press the "DMM" button to enter to the multimeter function interface;
b) Press the up, down, left and right direction keys or F1, F2, F3, F4 multi-function keys to select "Ω";
c) Insert the black pen into the input port of the COM banana socket, and insert the red pen into the input port of the V/Ω/C banana port;
d) Connect the red and black forms to the measured point. The resistance value of the measured point will be displayed on the screen.

4. Capacitance measurement
e) Press the power button to turn on, then press the "DMM" button to enter to the multimeter function interface;
f) Press the up, down, left and right direction keys or F1, F2, F3, F4 multi-function keys to select "⊣⊢";
g) Insert the black pen into the input port of the COM banana socket, and insert the red pen into the input port of the V/Ω/C banana port;
h) Connect the red and black forms to the measured point. The capacitance value of the measured point will be displayed on the screen.

5. Diode measurement
i) Press the power button to turn on, then press the "DMM" button to enter to the multimeter function interface;
j) Press the up, down, left and right direction keys or F1, F2, F3, F4 multi-function keys to select "⊣▷⊢";
k) Insert the black pen into the input port of the COM banana socket, and insert the red pen into the input port of the V/Ω/C banana port;
l) Connect the red and black forms to the measured point. The diode value of the measured point will be displayed on the screen.

6. On-Off measurement

m) Press the power button to turn on, then press the "DMM" button to enter to the multimeter function interface;
n) Press the up, down, left and right direction keys or F1, F2, F3, F4 multi-function keys to select "";
o) Insert the black pen into the input port of the COM banana socket, and insert the red pen into the input port of the V/Ω/C banana port;
p) Connect the red and black forms to the measured point. If the resistance of the measured point is less than 50 ohms, the instrument will emit "drop" sound.

7. Data retention function

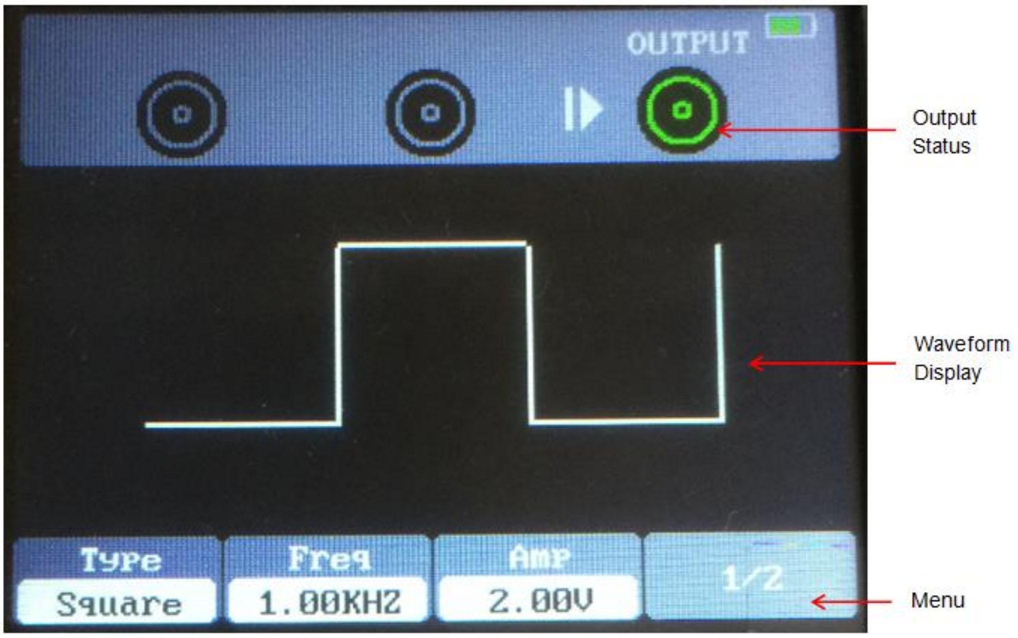
Press the button  on the instrument, and the displayed data will remain on the display, even if the input signal changes or eliminates, the value will not change.

Note: Please select the required measuring gear correctly and then measure again.

Generator

This chapter introduces the function of waveform generator.

Interface



Operation description

Press the power button to turn on, then press the "AWG" button to enter the waveform generator function interface.

1. Set type
   Press **F1** button to select the desired signal waveform, the optional waveform type includes square, triangle, sine, trapezoidal and four arbitrary.

2. Set frequency
   Press **F2** button to select **Frequency**, then use the up, down, left and right direction keys to adjust the frequency, press **F2** button to open the digital keyboard again, use the up, down, left, right direction keys and "Enter" key to set frequency parameter, select "OK" and press "Enter" button to confirm.

3. Set amplitude
   Press **F3** button to select **Amplitude**, then use the up, down, left and right direction keys to adjust the frequency, press **F3** button to open the digital keyboard again, use the up, down, left, right direction keys and "Enter" key to set frequency parameter,

select "OK" and press "Enter" button to confirm.

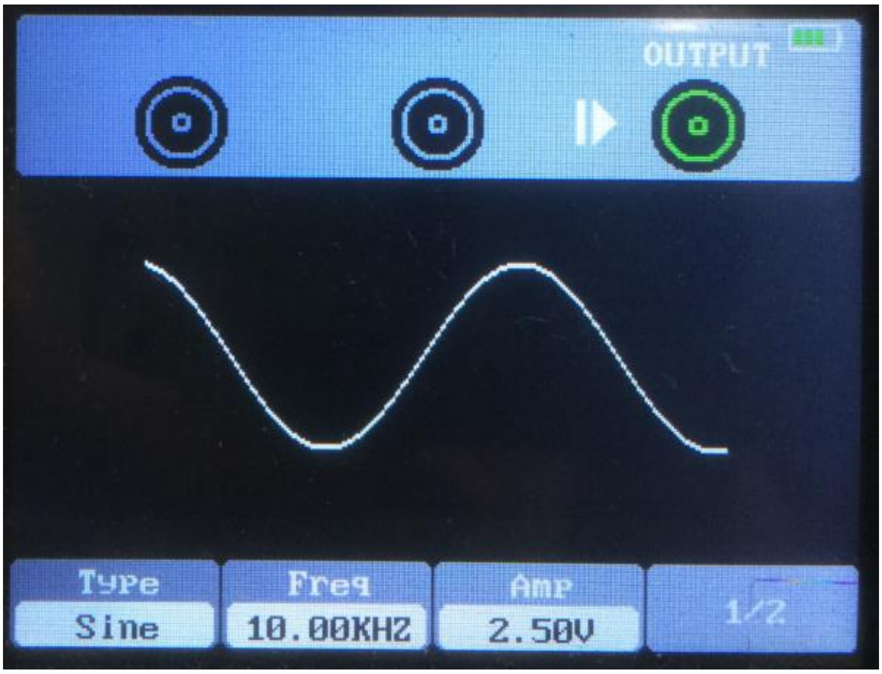
4. Set offset
   Press **F4** button to enter the second page. Press **F2** to select **Offset**, then use the up, down, left and right direction keys to adjust the frequency, press **F2** button to open the digital keyboard again, use the up, down, left, right direction keys and "Enter" key to set frequency parameter, select "OK" and press "Enter" button to confirm.

5. Set duty cycle
   enter the second page. Press **F3** to select **Duty**, then use the up, down, left and right direction keys to adjust the frequency, press **F3** button to open the digital keyboard again, use the up, down, left, right direction keys and "Enter" key to set frequency parameter, select "OK" and press "Enter" button to confirm.

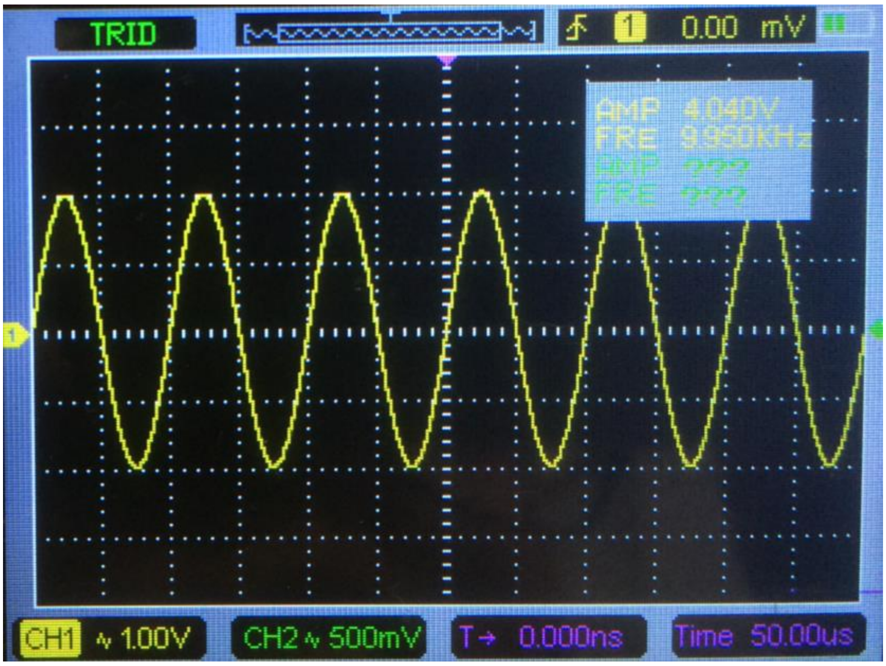
6. Generate an arbitrary waveform
   It is necessary to edit the arbitrary waveform in connection with the software and download it into the machine. There are 4 arbitrary wave positions, and each position can permanently store an arbitrary wave.

7. After setting the waveform parameters, press the  button to turn on or off the signal output. The output waveform of the signal generator can be observed through an oscilloscope.

For example, set a sine waveform with 2Vpp@10KHz to output as follows:



The waveform observed by an oscilloscope is as follows:



Troubleshooting

1. If the oscilloscope does not start up at power on, follow these steps:

1） Check whether the battery is installed and confirm whether the battery level is enough.
2） If the battery level is not enough, use the power adapter to charge.
3） Restart the instrument after the battery level is enough.
4） Contact your local HANTEK distributor or directly keep touch with HANTEK Technical Support department if the oscilloscope still can not be turned on normally.

2. If there is no display of waveforms on the screen when the oscilloscope is turned on, follow these steps:

1） Check the probe to assure its proper connection to the input BNC;
2） Check the channel switch (Channel button) to make sure it has been turned on;
3） Check the input signal to verify it has been connected to the probe correctly;
4） Affirm that all measured circuits have signals to output;
5） Turn up the magnitude for DC signals with large magnitude;
6） In addition, you may press the Auto button to perform an automatic detection of signals at first.
7） Contact HANTEK Technical Support department in time if there is still no display of waveforms.

3. If the waveform of the input signal is distorted seriously, follow these steps:

1） Check the probe to assure its proper connection to the channel BNC;
2） Check the probe to assure its good connection to the measured object;
3） Check the probe to verify it has been well calibrated. Otherwise, refer to the content about calibration described in this manual.

4. If the waveform is rolling continuously on the screen but can not be triggered, follow these steps:

1) Check the trigger source to make sure it consistent with the input channel;
2) Check the trigger level to assure its correct adjustment. You may press TRIGGER button to enter trigger menu, and use Up, Down, Right, Left direction keys to adjust trigger level to return to signal.

General Care and Cleaning

General Care

Do not put or leave the device in a place where the LCD display will be exposed to direct sunlight for long periods of time.

Note: To avoid damage to the oscilloscope or probes, do not expose them to sprays, liquids, or solvents.

Cleaning

Examine the oscilloscope and probes as often as operating conditions require. To clean the exterior surface, perform the following steps:

1） Use a lint-free cloth to remove floating dust on the outside of the oscilloscope and probes. Take care to avoid scratching the glabrous display filter.

2） Use a soft cloth dampened with water to clean the oscilloscope. For more efficient cleaning, you may use an aqueous solution of 75% isopropyl alcohol.

Note: To avoid damage to the surface of the oscilloscope or probes, do not use any corrosive or chemical cleaning agents.

Appendix A: Technical Specifications

All specifications herein mentioned apply to the series oscilloscopes. Before checking an oscilloscope to see if it complies with these specifications, make sure it meets the following conditions:

- The oscilloscope must have been operating continuously for twenty minutes under the specified operating temperature.
- The Do Self Cal operation must be performed through the Utility menu if the operating temperature changes by more than 5℃.
- The oscilloscope must be within the factory calibration interval.

All specifications are guaranteed unless noted ‘typical’.

Oscilloscope Specifications

Horizontal

Model	Hantek2C72/Hantek2D72	Hantek2C42/Hantek2D42
Band Width	70MHz	40MHz
Rising time	⩽5ns	⩽8.75ns
Sample Rate Range	250MSa/s(Single-channel), 125MSa/s(Dual-channel)	
Waveform Interpolation	(sin x)/x	
Record Length	Max. 6K samples for single-channel, 3K samples per dual-channel	
SEC/DIV Range	5ns/div~500s/div 1, 2, 5 sequence	

Vertical

A/D Converter	8-bit resolution, each channel sampled simultaneously
VOLTS/DIV Range	10mV/div~10V/divat input BNC
Selectable Analog Bandwidth Limit, typical	20MHz
Low Frequency Response (-3db)	≤10Hz at BNC
Rise Time at BNC, typical	≤5ns
DC Gain Accuracy	±3% for Normal or Average acquisition mode, 10V/div to 10mV/div

Note: Bandwidth reduced to 6MHz when using a 1X probe.

Acquisition

Acquisition Modes	Normal

Trigger

Type	Edge

Mode	Auto, Normal, single
Level	±4 divisions from center of screen
Trigger Level Accuracy	0.2div × volts/div within ±4 divisions from center of screen
Slope	Rising, Falling, Rising & Falling
Source	CH1, CH2

Input

Coupling	DC, AC or GND
Input Impedance, DC coupled	25pF±3 pF，1MΩ±2%
Probe Attenuation	1X, 10X
Supported Probe Attenuation Factors	1X, 10X, 100X, 1000X
Maximum Input Voltage	$150V_{RMS}$

Measurement

Cursor	Voltage difference between cursors: △V Time difference between cursors: △T
Automatic Measurements	Frequency, Amplitude

General Specifications

Display		
Display Type	2.8 inch 64K color TFT	
Display Resolution	320 horizontal by 240 vertical pixels	
Display Contrast	Adjustable	
Power Supply		
Supply Voltage	100V-240VAC, 50Hz-60Hz; DC INPUT: 5VDC, 2A	
Power Consumption	<2.5W	
Fuse	T, 3A	
Battery	2600mAh*2	
Environmental		
Operating Temperature	0℃ to 50℃	
Storage Temperature	-20℃ to 60℃	
Humidity	≤+104℉(≤+40°C): ≤90% relative humidity 106℉~122℉ (+41°C ~50°C): ≤60% relative humidity	
Cooling Method	Convection	
Altitude	Operating and Nonoperating	3,000m (10,000 feet)
	Random Vibration	$0.31g_{RMS}$ from 50Hz to 500Hz, 10 minutes on each axis
	Nonoperating	$2.46g_{RMS}$ from 5Hz to 500Hz, 10 minutes on each axis
Mechanical Shock	Operating	50g, 11ms, half sine

Mechanical	
Dimension	199 x 98x 40mm (L x W x H)
Weight	624g

Arbitrary Waveform Generator （Hantek2D72/Hantek2D42）

Waveform Frequency	Sine: 1Hz~25MHz Square: 1Hz~10MHz Ramp: 1Hz~1MHz EXP: 1Hz~5MHz
Sampling	250MSa/s
Amplitude	2.5Vpp(50Ω) 5Vpp(High impedance)
Frequency Resolution	0.10%
Channel	1CH waveform output
Waveform Depth	512Sa
Vertical Resolution	12 bit
Output Impedance	50 Ω
Square Characteristics	
Pulse width accuracy	±10ns

DMM

Maximum Resolution	4000 Counts
DMM Testing Modes	Voltage, Current, Resistance, Capacitance, Diode & On-Off
Maximum Input Voltage	AC : 600V DC : 600V
Maximum Input Current	AC : 10A DC : 10A

Range		**Accuracy**	**Resolution**
DC Voltage	400.00mV	±（0.8% + 5）	100uV
	4.000V		1mV
	40.00V		10mV
	400.0V		100mV
	600.0V	±（1% + 2）	1V
	Overload protection:		

	400mV: 250V, other: 600Vrms.		
AC Voltage	4.000V	±（1.2% + 5）	1mV
	40.00V		10mV
	400.0V		100mV
	600.0V	±（1.5% + 5）	1V
	Frequency: 40Hz~400Hz; Frequency of 400V and 600V: 40Hz~100Hz		
DC Current	40.00mA	±（1% + 2）	10uA
	200.0mA	±（1.5% + 2）	100uA
	4.000A	±（1.8% + 2）	1mA
	10.00A	±（3% + 2）	10mA
	Overload protection: self restoring fuse: 200mA/250V, 4A and 10A range no fuse.		
AC Current	40.00mA	±（1.3% + 2）	10uA
	400.0mA	±（1.8% + 2）	100uA
	4.000A	±（2% + 3）	1mA
	10.00A	±（3% + 5）	10mA
	Frequency: 40Hz~400Hz; self restoring fuse: 200mA/250V, 4A and 10A range no fuse.		
Resistance	400.0Ω	±（1% + 3）	0.1Ω
	4.000KΩ	±（1.2% + 5）	1Ω
	60.00KΩ		10Ω
	400.0KΩ		100Ω
	4.000MΩ		1KΩ
	40.00MΩ	±（1.5%±3）	10KΩ
	Overload protection: 220Vrms		
Capacitance	40.00nF	±（3% + 5）	10pF
	400.0nF		100pF
	4.000uF		1nF
	40.00uF		10nF
	100.0uF		100nF
	Overload protection: 220Vrms		
Diode	0V~2.0V		
On-Off	<50Ω		

Appendix B: Accessories

All the following accessories are available by contacting your local HANTEK distributor.

Standard Accessories

- Probe×1 (1.5m), 1:1, (10:1) Passive Probes
- A Power adapter
- A USB Line
- Crocodile clip line *1 (For Hantek2C42/Hantek2C72)
- Crocodile clip line *2 (For Hantek2D42/Hantek2D72)
- A Multimeter Probe
- A PC software CD of the oscilloscope
- Warranty Card
- Manufacturer Certificate